NEGATIVE DECLARATION

Submitting: ☒ **Draft**
☐ **Final**
☐ **Mitigated Negative Declaration**

Project Title: Enhanced In Situ Bioremediation of Chlorinated Solvent Plume at Installation Restoration Site 70, Naval Weapons Station Seal Beach

State Clearinghouse Number:

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Project Location (*Include County*):

NAVWPNSTA Seal Beach is located at 800 Seal Beach Boulevard, Seal Beach, Orange County, California, and consists of approximately 5,000 acres of land along the Pacific Ocean within the City of Seal Beach. NAVWPNSTA Seal Beach is bordered on the southwest by Anaheim Bay, on the north by Interstate Highway 405 (San Diego Freeway), on the east by Bolsa Chica Road, on the west by Seal Beach Boulevard, and on the southeast by an Orange County Flood Control Channel (OCFCC). IR Site 70 (also known as the Research, Testing, and Evaluation [RT&E] Area) is located on the west side of the station, approximately 0.7 mile north of the Seal Beach National Wildlife Refuge (NWR). IR Site 70 consists of multistory office and production buildings, asphalt-paved parking areas, a number of aboveground tanks, attandant above and belowground piping distribution systems, several concrete-lined sumps, and underground storage tanks.

Project Description:

Under the California Health and Safety Code, section 25356.1, the Department of Toxic Substances Control (DTSC) proposes to approve a Proposed Plan/Draft Remedial Action Plan (RAP) for groundwater treatment using enhanced in situ bioremediation of the chlorinated solvent plume at Installation Restoration (IR) Site 70 (Site), Naval Weapons Station, Seal Beach (NWSSB). The Final Revised Groundwater Feasibility Study Report, Installation Restoration Program, Site 70, Naval Weapons Seal Beach is incorporated by reference.

Background/History:

The NAVWPNSTA Seal Beach was originally commissioned in 1944 at the height of World War II as a Naval Ammunition and Net Depot. It is one of several weapons stations maintained by the Navy to provide fleet combatants with ready-for-use ordnance. The Station includes a headquarters with central and administrative support detachments as well as storage, testing, and production facilities that support the Station's mission. The Station serves as a supply point for half of the Navy and Marine Corps forces operating in the Pacific region. Past hazardous waste disposal practices at the Department of Defense (DoD) installations resulted in the release of pollutants into the environment. Since 1975, the DoD has been investigating and cleaning up these pollutants through the Installation (IR) Programs.

Installation Restoration (IR) Site 70 is the former National Aeronautics and Space Administration (NASA) Research, Testing, and Evaluation (RT&E) Area on Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach). The area consists of multistory office and production buildings, asphalt-paved parking areas, an assortment of aboveground tanks and attendant above-and below-ground piping distribution systems, several concrete-lined sumps, and underground storage tanks (USTs). From 1962 to 1973, NASA used the area for the design and manufacture of the Saturn II launch vehicle for the Apollo Program. Subsequent to NASA leaving the area, the United States Department of Energy and Garrett Engineering (Allied Signal) conducted pilot test assembly operations for a classified uranium enrichment process in portions of Building 112 (S-03). These tests were conducted from 1980 to 1985 but did not include either the manufacture or enrichment of uranium. Currently, the building is used for storage, communications research, and office space.

Chemicals used included industrial solvents, primarily volatile organic compounds (VOCs), lubricating oils, and detergents in the manufacturing process. This resulted in contamination to groundwater under IR Site 70. The primary VOC at the

Site is trichloroethene (TCE). Other VOCs present are chloroform, dichloroethane (DCA), dichloroethene (DCE), tetrachloroethene (PCE), and vinyl chloride. Extensive field investigations and laboratory analyses of soil and groundwater have been conducted. Human health and environmental risk assessments have also been performed. The risk screening assessment determined that potential risks from exposure to contaminants in soil and groundwater at Site 70 may exist.

In 1993, a Preliminary Assessment (PA) of Site 70 was conducted and ten Areas of Concern (AOCs) were identified based on historical activities, use of chemicals at the Site, and the likelihood of a potential threat to human health and the environment. AOCs were designated for various areas. This PA identified the major chemicals of concern and recommended further evaluation at Site 70 to assess the presence of these contaminants. In 1996, a Removal Site Evaluation (RSE) was conducted to address potential waste sources. During the RSE, an additional AOC was designated for soil, for a total of 11 areas of concern (AOCs). Of the 11 AOCs, four (4) pertained to soil, and the remaining seven (7) AOCs are associated with site stuccoes (that is, tanks, piping systems, other associated structures) at Site 70. The RSE report recommended that the tanks, piping systems, and associated structures be decommissioned after theses AOCs were removed from the IR program after cleanup.

In 1998, an Extended Removal Site Evaluation (ERSE) was conducted at Site 70 to supplement data from the previous investigations. The ERSE was a comprehensive investigation that served as the Remedial Investigation and to investigate hazardous waste sites. The ERSE included soil and groundwater sampling and provided information that enabled the Navy to better define the nature and extent of soil and groundwater contamination and assess potential threats to human health and the environment. During the ERSE, the Navy performed the following: geophysical survey, soil gas survey, and soil and groundwater sampling. The ERSE information refined understanding of the subsurface conditions and the migration of the TCE plume and chemicals in groundwater. Aquifer testing was performed at Site 70 in 1998 to further characterize hydrogeologic properties of the shallow aquifer underlying the source area and develop a groundwater flow computer model. Between November 1998 and 1999, a pilot test was conducted in the source area to assess the effectiveness of contaminant removal by continuous pumping. Data obtained from the aquifer and pilot tests were used in the development of remedial cleanup alternatives. Based on recommendations in the ERSE, groundwater sampling was performed to monitor the VOC plume at Site 70 and to further define the extent of metals (hexavalent chromium and mercury) in groundwater pursuant to the "Final Work Plan for Long-Term Groundwater monitoring at Installation Restoration Sites 40 and 70, NAVWPNSTA Seal Beach." Eleven new groundwater monitoring wells were installed, and the closest of the Navy's former water supply wells Navy Well No. 2, was permanently sealed off. Samples were analyzed for VOCs and natural attenuation parameters to determine if natural conditions and processes occurring in the groundwater were capable of reducing concentrations of contaminants.

The soil sampling results from additional investigations including the Remedial Investigation (RI) indicated that most of the original releases of VOCs have moved into the groundwater or evaporated into the air. Based on the environmental studies and risk screening assessment, it was determined that no cleanup action is necessary for soil at IR Site 70. Although there is no immediate threat to human health or the environment from groundwater at the Site, the ERSE report recommended further action to address groundwater at IR Site 70 because cumulative human-health risk exceeded the generally acceptable range as defined by the National Contingency Plan (NCP).

Aquifer testing was performed at Site 70 in August to September 1998 to further characterize the saturated zone and provide data to support evaluation of remedial alternatives. Two extraction wells and five piezometers were installed, and step drawdown tests were performed in the extraction wells. A constant discharge rate pumping test was also performed in the shallow groundwater well. Groundwater samples were collected during pumping tests. From November 1998 to February 1999, BNI conducted a shallow groundwater pilot test at IR Site 70. The pilot test consisted of pumping 2.5 gallons per minute from a well near the contamination source for three (3) months. The saturated zone was characterized by determining the contaminant concentration distribution before and after the pilot test and defining the effective pumping radius of influence and groundwater parameters.

Contaminated groundwater at IR Site 70 is present in two distinct phases, which comprise the VOC plume, including the source area within the shallow groundwater zone and the dissolved phase plume that extends from around the source area to the leading edge of the plume. Groundwater sampling results indicated that the source area is contaminated with TCE and other VOCs. The high concentrations of contaminants in the source area are indicative of what is known as

dense non-aqueous phase liquids (DNAPL). The presence of DNAPL is critical because the pure phase liquid continues to dissolve and produce a continuing source of VOCs into the dissolved phase plume. The dissolved phase plume area is the larger, remaining portion of the plume that contains TCE and VOCs that have dissolved in groundwater and are present at lower concentrations. The lateral extent of the plume is approximately 2,400 feet long by 2,000 feet wide and approximately 195 feet deep.

Concentrations of VOCs in groundwater exceed the state and federal primary maximum contaminant levels (MCLs). Cleanup of groundwater is recommended at IR Site 70 because TCE and other VOCs were reported in groundwater at concentrations that could result in adverse effects to human health if this water was extracted from the ground and used for domestic purposes such as drinking or bathing. However, the affected groundwater is not used for such purposes due to naturally occurring salinity levels and hard mineral concentrations. Yet cleanup is necessary to control migration and reduce concentrations of VOCs in groundwater to levels that are protective of human health and the environment and in compliance with applicable water quality standards. The proposed remedy for IR Site 70 is Alternative 11, in situ treatment, enhanced bioremediation.

For the dissolved phase plume are, Alternative 11 would involve creation of bioactive zones or biobarriers that transect the plume and treat VOCs as they migrate through. The biobarriers would be created by injecting an electron donor (emulsified vegetable oil or EVO and halorespiring bacteria (KB-1tm) into the subsurface to stimulate the bacteria to biodegrade VOCs into ethene, the non-toxic end–product of dechlorination. This process is referred to as bioaugmentation.

For the source area, Alternative 11 consists of bioaugmentation, which is the injection of EVO and halorespiring bacteria into the subsurface to dechlorinate VOCs to achieve enhanced dissolution and removal of DNAPL and accomplish remedial goals.

The project is anticipated to commence in September 2006. The construction phase is anticipated to take four (4) weeks for Phase I this year and for Phase II, another four weeks next year. The operations and maintenance phase is expected to last approximately 15 years.

As mentioned previously, NAVWPNSTA, Seal Beach conducted field investigations and laboratory analyses of soil and groundwater. Assessment for potential risks to human health and the environment has also been conducted. This risk screening assessment determined that potential risks form exposure to contaminants in soil and groundwater may exist. The soil sampling results from investigations, including the Remedial Investigation (RI) indicated that most of the original releases of VOCs have already moved into the groundwater or evaporated into the air. Based on the environmental studies and risk screening assessment, it was determined that no cleanup action is necessary for soil at Site 70.

Health Risk Discussion:

Four chlorinated volatile organic compounds (VOCs) are chemicals of concern (COCs) at IR Site 70: 1,1-dichloroethene, TCE, vinyl chloride, and chloroform. The remedial technologies have been evaluated based on their ability to address these VOCs. These constituents were identified based on their contribution to the screening-level carcinogenic risk for tap water and frequency of occurrence at the Site. The total cancer risk associated with groundwater at IR Site 70 was estimated at one in one million (1.2×10^{-1}) using U.S. EPA tap water Preliminary Remediation Goals (PRGs). Chlorinated VOCs contribute 98.5 percent of the total carcinogenic risk according to the report of BNI, 1999a.

COCs, cleanup goals, and corresponding maximum reported concentrations are provided below:

Chemical VOC	Goal: California Maximum Contaminant Level (MCL) Cleanup Goal Micrograms per liter (ug/L)a,b	Goal: United States Environmental Protection Agency(U.S. EPA) a,b	Reported Maximum Concentration Micrograms per liter (ug/L)
Chloroform	100	100	460
1,1-dichloroethane (DCA)	5	7	159 [c]
1,1-dichloroethene (DCE) [d]	6	7	299
Cis-1,2-cichloroethene (DCE) [d]	6	70	50,900 [c]
Trans-1,2-dichloroethene (DCE) [d]	10	100	2,600 [c]
Tetrachloroethene (PCE)	5	5	3,940 [c]
Trichloroethene (TCE)	5	5	837,000
Vinyl Chloride	0.5	2	960

Notes:

a. Federal and state cleanup standards are established by the U.S. EPA Safe Drinking Water Act in Title 40 Code of Federal Regulations, Section 141 and State cleanup standards are established by the California Code of Regulations, title 22, sections 64439 and 64444.
b. All values are reported in micrograms per liter.
c. Chemical not identified as a risk driver during the ERSE, but added as a COC because it was reported at IR Site 70 at concentrations above the MCL.
d. Variations of the compound, DCE.

Although the Extended Removal Site Evaluation (ERSE) sampling results showed metals exceeding background levels (BNI, 1999a), metals were ruled out as COCs at IR Site 70 because:

- metals are concentrated in the heavy use areas of the RT&E facility;
- single occurrences of metals reported above the statistical background were isolated;
- naturally occurring metals, such as copper, iron, manganese, and arsenic, are widespread, and their range of concentrations can largely be attributed to various organic and inorganic adsorption mechanisms; and
- the cancer and noncancer risk drivers at IR Site 70 are overwhelmingly chlorinated volatile organic compounds (VOCs).

No ecological risk screening was performed for groundwater because there is no pathway for plants and wildlife to come into contact with groundwater.

For the purposes of this remedial action, the area to be addressed corresponds to the footprint of the TCE plume at IR Site 70. Because of the levels of contamination encountered, the affected media (i.e., groundwater) will be addressed as two separate areas within the plume:

- a suspected dense nonaqueous-phase liquid (DNAPL) area and
- a dissolved-phase plume.

The suspected DNAPL area corresponds to the 10,000 µg/L isocontour of TCE at the less-than-35-foot depth interval. It is assumed to extend to approximately 50 feet below ground surface (bgs). The corresponding area at the surface is

approximately 5,700 square feet, and the total volume (all media) is approximately 285,000 cubic feet (10,600 cubic yards). The area of the dissolved-phase plume is approximately 2,500 by 1,000 feet at its largest footprint in the 75- to 110-foot-bgs depth interval.

As previously discussed, the selected remedy for groundwater at IR Site 70 is enhanced *in situ* bioremediation, monitored natural attenuation (MNA), and land-use controls. *In situ* enhanced bioremediation promotes degradation of VOCs into harmless end-products. The dissolved phase plume will be segmented through the installation of injection wells that are perpendicular to the axis of the groundwater flow direction (i.e., biobarriers). The VOCs would be treated as they migrate through these biobarriers which transect the plume. The biobarriers would be created by the addition of a slow release electron donor (emulsified vegetable oil [EVO]), which would be immobile relative to groundwater flow, and the injection of requisite halorespiring microorganisms contained in a stable commercially-available culture called KB-1™. The injection of a microbial culture, referred to as bioaugmentation, is required when the key halorespiring strains of the bacterium are absent or too poorly distributed to allow bioremediation to achieve complete dechlorination to non-toxic end-products and to meet remedial goals in a timely fashion. The EVO would be metabolized to produce the hydrogen needed by the halorespiring bacteria that breakdown chlorinated VOCs. The Navy will implement enhanced bioremediation in the source area through a grid of injection wells that will contain and treat the plume from the perimeter of the source area initially and subsequently into the highest source area. For the source area, bioaugmentation will be conducted through the injection of EVO and halorespiring bacteria (KB-1™) into the subsurface to create anaerobic conditions, provide electron donor and microbial consortia to dechlorinate the VOCs, and accomplish the remedial goals in a reasonable timeframe.

In situ groundwater remediation addresses the risk posed by VOC contamination (which can be characterized as the primary threat at IR Site 70) by degrading VOCs to harmless by-products, thus permanently destroying the contaminants and significantly reducing the toxicity, mobility, and volume of hazardous substances in groundwater. Land-use controls are necessary to protect the integrity of the groundwater application and monitoring wells and associated piping and equipment. Land-use controls are also necessary to prevent use of contaminated groundwater until remediation is complete.

Project Activities:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (that is, within the DNAPL source area and biobarriers): In the DNAPL source area, project implementation would employ a grid of standard two (2)-to-four (4) inch diameter wells installed using a hollow stem auger to a depth of 50 feet below ground surface (bgs) to deliver the oil emulsion and bacterial culture to the aquifer. Each well will be screened between 35 and 50 feet bgs using v-wrapped screens. Treatment is estimated to occur over a 200 by 300 foot area. Assuming a 13 foot radius of influence during injection of the EVO, approximately 48 wells will be required. In addition to the source area, impacted groundwater has migrated toward the northern site boundary. Biological treatment to contain the source area would be achieved by injecting electron donor along an approximate 200 foot length of the northern site boundary that would require approximately nine (9) additional injection wells for a total of 57 wells for the source area. EVO would be delivered to the source area to achieve a residual oil saturation of one (1) % of the pore volume. Groundwater from the intermediate zone will be pumped to provide the Site water for mixing. EVO would be injected every two years into the source area. A 15-year duration is required to treat the DNAPL source after which MNA is assumed to provide adequate mass control.

  In the dissolved phase plume, project implementation would employ a series of biobarriers oriented perpendicular to the direction of the plume migration along the groundwater flow path. The biobarrier transects would be placed at a spacing equal to five (5) years of groundwater flow. Based on currently available hydrogeologic data, this may be achieved by spacing the biobarriers 500 feet apart within the first and second sand units at the Site. Based on the distribution of VOCs above a concentration of 50 ug/L (the effective bioremediation action level), the biobarriers would be approximately 500 to 800-feet wide. An estimated total of six (6) biobarriers would be required: four (4) in the upper sand unit; two (2) in the lower sand unit). Three biobarriers are assumed to have an average width of 500 feet and be comprised of 20 wells each for a total of 60 wells for these biobarriers (20 wells in the second sand unit; 40 in the first sand unit). The remaining three (3) biobarriers are assumed to have an average width of 800 feet that will require 32 wells per barrier, or 96 wells total (32 wells in the second sand unit, 64 in the first sand unit). Injection wells within each biobarrier will be spaced on 25 foot centers that will provide some overlap of the oil distribution based upon the 25 foot radius of influence observed in previous pilot tests. Shallower wells will be standard two (2) to four (4)-inch-diameter wells installed by using mud rotary due to heaving sands to a depth of 160 feet bgs. Each deeper well will be screened between 120 to 150 feet bgs by using v-wrapped screens. The six (6) biobarriers will require a total of 156 injection wells to dissect the VOC plume. Assuming a 13-foot radius of

injection and screened intervals of 30 and 40 feet in the shallower and deeper sand units respectively, each deeper well would require 1,850 kilograms of EVO every two years assuming biannual injections and each shallower well would require 1,250 kilogram (kg) of EVO every two years. It has been assumed that the passive biobarriers in the plume would be required between four (4) years at the toe of the plume to six (6) years nearer the source area. After this, MNA would provide adequate mass control.

The oil injections would occur using temporary injection equipment consisting of a proportional feed system designed to introduce an amendment solution into a water stream at a known ratio of the delivered flow rate. The proportional feed system will consist of multi-channels (upwards of 30 to 40 channels) allowing for injections into multiple wells to occur at the same time. Groundwater would be extracted from one (1) or more nearby wells, blended and fed through the proportional feed system, and amended with the oil emulsion prior to splitting of the flow into up to 40 injections wells. The injection equipment will be temporary and will be manually operated. Equipment required to construct each multi-channel injection system includes up to 40 proportional feed injectors, flow control elements (valves, flow meters, etc.) groundwater extraction pumps, piping, and in-line filters. The oil emulsion will be injected directly from the shipping containers; consequently, no permanent storage is required. Injections of the fluids will be required eight (8) to 11 days, assuming injection rates of five (5) and 10 gallons per minute (gpm) are achievable into each source and plume area wells respectively, per biobarrier (up to 40 wells at a time). This would require a total of 73 10-hour days. The time for injection may be altered, depending on achievable injection rates.

Equipment to be used includes the following: drill rig, development rig, backhoe, and support vehicles.

- Treatment of groundwater using EVO and halorespiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs: Bioaugmentation would be used to stimulate complete biodegradation of the chlorinated ethenes to innocuous end products (ethene, carbon dioxide). A commercially available mixed culture containing the dechlorinating microorganism halorespiring bacteria (KB-1™) would be added to each injection well at the rate of 10 liters per well one month after injection of the oil emulsion.
- MNA as a polishing step until cleanup goals are achieved: This is an end-stage process in which natural biodegradation of VOCs continues to occur within the groundwater;
- Treatment system performance monitoring throughout the remedial action. Biannual monitoring would involve collecting and analyzing groundwater samples from wells within and along the downgradient migration pathways of the plume. Six existing monitoring wells would be used, and five (5) additional monitoring wells should be installed initially. Additional monitoring wells will be added based on the number of biobarriers installed. Groundwater levels would be measured in new and existing wells to confirm groundwater flow patterns and vertical gradients. Monitoring will be performed to track the plume over time and identify that dechlorination is occurring at rates sufficient to attain remedial objectives and within the time frame predicted by groundwater modeling. A long-term remediation monitoring plan would document the actual monitoring program and contain a contingency plan triggering actions to manage any future expansion of the plume pursuant to United States Environmental Protection Agency (U.S. EPA) guidance. Additional well installation to track changes in the extent of the plume are included as part of the plan. Monitoring data would be used for periodic reviews every year to assess plume migration dechlorination activity, to evaluate the extent of microbial migration, and the adequacy of the remedial action to meet objectives. Reviews would be documented in a summary report issued to the appropriate regulatory agencies. These reports may suggest modification to the cleanup program as needed;
- Confirmatory groundwater sampling during and at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels; and
- Land-use controls to prevent use of contaminated groundwater, protect equipment, and allow access for sampling, installing new monitoring wells, and implementing any remedial measures needed in the future.
- A site health and safety plan will be developed for the project and will be prepared according to the requirements of 29 CFR 1910.120, and CCR Title 8 General Industrial Safety Order (GISO) 5192 for work at hazardous waste sites. The HSP will contain, at a minimum, the elements included in the Hazards and Hazardous Materials, section 7, of the Initial Study.

Findings of Significant Effect on Environment:

The Department of Toxic Substances Control (DTSC) has prepared an Initial Study pursuant to the requirements of the California Environmental Quality Act (CEQA, Section 21000 et seq., California Public Resources Code) and implementing

Guideline (Section 15000 et seq., Title 14, California Code of Regulations). Based upon this analysis, DTSC has determined that the proposed project will not have a significant effect upon the environment.

(A copy of the Initial Study which supports this finding is attached.)

Mitigation Measures:

DTSC has determined that the project does not require any mitigation measures beyond those incorporated as part of the project description.

DTSC Branch Chief Signature		Date
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